REMARKS

This is a full and timely response to the non-final Office action mailed November 27, 2006. Reexamination and reconsideration in view of the foregoing amendments and following remarks is respectfully solicited.

Restriction Requirement

In the office action the Examiner has maintained a restriction requirement made on August 14th, 2006. Applicants again respectfully point out that this restriction requirement was received after the submission of a first office action on the merits, a second office action on the merits, an advisory action, and the filing of a notice of appeal along with a request for pre-appeal review. Applicants again note that this highly unusual, and applicants again question propriety of issuing a restriction requirement after prosecution on the merits has proceeded to this point.

In maintaining the restriction requirement, the Examiner has stated that "applicant needs to state that the inventions are patentably distinct or are Not patentably distinct". Applicants disagree, and submit that applicants are not required to admit that the claims are not patentably distinct to traverse the restriction. **Instead, Applicants traverse the restriction because the Examiner has failed to show there would be a "series burden on the Examiner" if restriction is not required.** See MPEP 808.02. Applicants again submit that such a showing of burden has not been provided, and further submit that one cannot be so provided. For example, applicants note that the Examiner has already examined these claims on the merits, and thus it cannot be said these claims now would require a different field of search or that such a search would be a burden on the Examiner. Furthermore, applicants note that the current rejections based upon Scott and Ling are fundamentally the exact same rejections that have been applied to the non-elected claims in the previous office actions. Applicants thus submit that a serious burden cannot be shown, and that the restriction requirement should be withdrawn.

Claim Objections

In the office action, the Examiner objected to the phrase "residuals" as it was defined at page 5, lines 4 and 5, apparently concluding that "residual difference" was redundant. Accordingly, applicants have amended paragraph 0024 to remove the term "residual" preceding the term "difference", as was suggested by the Examiner. Applicants have also amended paragraph 0027 in a similar manner. Applicants thus submit that this objection has been overcome.

Specification Objections

In the office action, the Examiner advised that "residual" be cancelled from the phrase "residual difference". As stated above, applicants have amended paragraph 0024 to remove the term "residual" preceding the term "difference", as was suggested by the Examiner. Also, applicants have also amended paragraph 0027 to remove "difference" following the term "residual". Applicants thus submit that these amendments overcome the Examiner's objections.

Rejections Under 35 U.S.C. § 112

In the office action, claims 1, 5-7, 9-11, 31, 33, 34 and 36-38 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. With regard to claims 1 and 31, the Examiner stated that it was not clear what is meant by the term "data type" and the term "likelihood". Applicants respectfully disagree, and submit that these terms of appropriately clear. Specifically, the term "data type" simply means a type of data. Examples of types of data for which membership functions can be created are described in detail in applicant's specification. See paragraphs [0053]-[0055] which give several different examples. Likewise, the usage of the term "likelihood" merely follows the accepted definition of the term, e.g., a probability. Thus, the phrase "determine a likelihood that a fault has occurred in the turbine engine" means that a probability (by any measure) that a fault has occurred is determined. Thus, applicants

submit that these terms are properly clear and defined, and meet the requirements of section 112.

With regard to claims 11 and 38, the Examiner stated that applicant's specification at page 5, lines 6-8 recites "determining rate of change of residual data OR determining margin levels" and then alleges that there is no disclosure of "augments the sensor data by determining a rate of change of the residual data AND further augments the sensor data by determining a margin".

Applicants disagree, and submit that the claims are clear and distinct. First, applicants note that claims 11 and 38 were included in the original filing, and as such are fully supported by the application as filed. Second, the alleged contradiction is without basis in fact. The specification at page 5, lines 6-8 is describing examples of how residual data can be augmented, and there is no basis for inferring that such examples must be exclusive, especially in light of the express teaching in claims 11 and 38. Furthermore, FIG. 3 shows a specific example where sensor data is augmented both by calculating rates of change and by determining a margin. See also paragraphs 0025 to 0040, which describe this example in great detail. Thus, applicants submit that the language in the claims is clear and definite, and that the rejection has been overcome.

With regard to claims 11 and 34, the Examiner stated that it was not clear what all is meant and encompassed by a "maximum safe temperature", alleging that the term "maximum safe" is indefinite in the claim, and the scope of the claim is uncertain. Applicants disagree, and submit that the scope of the claim is clear when properly interpreted in light of the specification. Specifically, the specification at paragraph [0036] specifically describes one method of the EGT margin being calculated. This example states that the EGT margin represents the number of degrees between the current operating conditions and the "temperature redline for that particular engine model", where the engine's redline is generally a "safety limit on temperature for the engine's

operation". Thus, the maximums safe temperature is simple a temperature limit set for the operation of the turbine engine, above which the safety of the engine could be comprised. Furthermore, applicants have amended claims 11, 26 and 34 to recite a "selected maximum safe exhaust gas temperature for the turbine engine" thus further clarifying that the temperature is a selected exhaust gas temperature for the turbine engine. Taken in this context, the use of the term "maximum" clearly is well defined and meets the requirements under section 112. Thus, applicants submit that this rejection has been overcome.

With regard to claim 31, the Examiner stated that the applicant recites "processor" and a "sensor data processor", and that there is no distinction between the processors in the claim. Accordingly, applicants have amended claim 31 to recite "computing processor" to further clarify the distinction between that processor and the sensor data processor that is part of the fault detection program that resides in memory and is being executed. Thus, applicants submit that this rejection has been overcome.

Rejections Under 35 U.S.C. § 102

Claims 1, 5-7, 9-10, 31, 36 and 37 were rejected under 35 U.S.C. § 102 as allegedly being anticipated by U.S. Patent No. 6,098,011 to Scott, hereinafter Scott. The Examiner stated that Scott discloses a fault detection system for detecting faults in an aircraft system, where the fault detection system includes a sensor data processor providing an augmented data set and a logic inference system, the logic inference system analyzing the augmented data set to determine the likelihood that a fault has occurred.

Applicants note that this is the third time the Examiner has made a rejection based upon Scott, and that the rejection was previously made the subject of pre-appeal review in which the Examiner was forced to withdraw the rejection. Applicants question the propriety of continuing a rejection after having previously withdrawn a rejection based on Scott during pre-appeal review.

In making these rejections, the Examiner again cited errors 28 and 38, described in column 3, lines 1-65 of Scott, in stating that Scott teaches a system that determines a likelihood that a fault has occurred. Apparently, the Examiner equated errors 28 and 38 of Scott with the determined "likelihood that a fault has occurred in the turbine engine" recited in applicants claims. Applicants disagree, and submit that **because the errors 28 and 38 are not an output of the fuzzy logic system, and because they are not a determined "likelihood that a fault has occurred in the turbine engine", they cannot satisfy the claimed limitations.**

Applicants submit that the system described in Scott instead is used to arbitrate between two sensed values (see the abstract Scott) to determine a single value for a sensor from multiple sensors. See column 3, lines 52-62 of Scott, which describes how the system is operable to generate a single output value from multiple sensors. The resulting single output is then submitted to the primary engine control algorithms for processing. For example, the output is used in the control of actuators on the engine. See FIG. 1 of Scott, as one example. Thus, the errors 28 and 38 described in Scott are not a determined likelihood that a fault has occurred", nor are they in any way used to determine the likelihood of a fault.

Furthermore, **the errors 28 and 38 determined Scott are not determined by fuzzy logic system**—they are instead used as **inputs** to that system. Again, applicants submit that FIG. 2 of Scott clearly shows a system where the difference between two sensor values is calculated by the comparator 24, an absolute value of the difference is generated by absolute value operator 26. The output of the absolute value operator 26 is defined as "first signal 28 which is the absolute value of the difference between sensors A and B." This difference signal is referred to as the "first error 28". See column 2, line 62 to column 3, line 3 of Scott. That first error 28 is then used as an **input** to the fuzzy logic algorithm 40. The first error 28 is thus not an **output** from the fuzzy logic algorithm 40 indicating an error, as was alleged by the Examiner. Thus, the first error 28 is not the

result of a fuzzy logic system analyzing the augmented data set to determine a likelihood that a fault has occurred in the turbine engine.

Instead, the first error 28 is used with the second error 38 as **inputs** to the fuzzy logic algorithm 40, which in turn generates a numerical output 42 that represents "the graded memberships of the first error 28 and the second error 38 as determined by the fuzzy logic look up table 40". See column 4, lines 25-28 of Scott. These graded memberships are then used to generate a "preselected weighted average of the two sensed values". See column 4, lines 33-35 of Scott. Specifically, the portion 48 uses the graded memberships to "to create a single output value 58 for use as the compressor discharge pressure parameter in question". See column 4, lines 33-44 of Scott. Thus, the **output** of the fuzzy logic algorithm 40 in Scott is used generate **a single output value for the parameter in question**. The fuzzy logic algorithm 40 in Scott is **not** used to analyze an augmented data set to "determine a likelihood that a fault has occurred in the turbine engine" as recited in applicants amended claim 1, and similarly recited in claims 12, 21 and 31.

In summary, because the errors 28 and 38 are not an output of the fuzzy logic system, and because they are not a determined likelihood that a fault has occurred in the turbine engine, they cannot satisfy the claimed limitations, and claims 1, 12, 21 and 31 are patentably distinct over Scott.

Furthermore, the Examiner has failed to address several significant limitations in the independent claims. For example, amended independent claim 1 recites that the sensor data processor augments the sensor data by "generating residuals from the sensor data and determining a rate of change of the residuals". Claim 31 includes similar limitations. The Examiner has refused to address these limitations. Instead, the Examiner has made a vague allegation that such limitations are merely a statement of intended use or field use, and that these features do not impart any structural feature that

distinguishes the claimed navigation system from the navigation suggested by the prior art. In support of this allegation, the Office action cites M.P.E.P. §2114. However, as will now be explained, applicant submits this section of the M.P.E.P must be read in concert with other case law regarding functional language recited in claims. Applicant further submits that the claims do not include mere statements of intended or desired use, and that the claims actually do recite structure that is distinguishable from the prior art. Furthermore, applicants have amended the claims to further clarify this structural relationship.

First of all, it is well-settled that "[t]here is nothing inherently wrong with defining some part of an invention in functional terms." M.P.E.P. § 2173.05(g). Moreover, a claim is not improper merely because it includes functional language. In re Swinehart, 439 F.2d 210, 169 USPQ 226 (CCPA 1971). Functional terms that are included within claims cannot be summarily ignored or dismissed. Instead, the M.P.E.P. dictates that functional terms, just like all other claim terms, must be evaluated and considered for what the terms convey to a person of ordinary skill in the pertinent art, and in the context in which such terms are used. M.P.E.P. § 2173.05(g).

In addition, Applicant submits that the pending claims do not include mere recitations of intended or desired use. For example, amended claim 1 recites a system with sensor data processor that is "configured to receive sensor data from the turbine engine and augment the sensor data to provide an augmented data set" a fuzzy logic inference system that is "configured to receive the augmented data set" and is "configured to fuzzify the augmented data set using the plurality of membership functions and analyze the augmented data set to determine a likelihood that a fault has occurred in the turbine engine". Hence, it is clear that independent Claim 1 recites a uniquely configured fault detection system with components uniquely configured to perform specific procedures for fault detection in a turbine engine. Likewise, amended independent claim 31 recites an apparatus that includes a memory and a processor, with the processor executing a

program adapted to perform a fault detection in a turbine engine. Thus, applicants submit that claims 1 and 31 recite a specifically configured fault detection system and apparatus, and that **ALL** the recited limitations of those claims must be given proper patentable weight.

That being said, applicants can find no teaching in Scott of a augmenting a data set, determining a rate of change of the residuals and using the rate of change as part of an augmented data set which is fuzzified and analyzed to determine a likelihood that a fault has occurred in the engine.

For all these reasons, applicants submit that amended independent claims 1 and 31 are patentably distinct over Scott. Furthermore, as the various dependent claims depend from and include all the limitations of their respective independent claims, they are also submitted to be patentably distinct over the cited references.

With regard to claim 10, amended claim 10 recites that fuzzy logic inference system is further configured to aggregate outputs of the plurality of rules and defuzzifies the aggregated output for input into **a diagnostic system**. Applicants can find no teaching of any aggregated output of the fuzzy logic system into a **diagnostic system**. Claim 36 includes similar limitations, and claims 11, and 37 depend from these claims. **Applicants again note that the Examiner failed to reference any specific portion of Scott as teaching this feature.**

With regard to claims 11, 33, 34 and 38, these claims were rejected under 35 U.S.C. § 103 as allegedly being unpatentable over Scott in view of Ling (U.S Patent No. 5,718,111). In this rejection, the Examiner admitted that Scott did not disclose the use of specifically recited sensors in those claims. However, the Examiner then stated that Ling discloses the use of these sensors in a turbine engine. Applicants respectfully disagree. While Ling does teach the use of the various sensors, applicants submit that Ling, like Scott, fails to teach the use of these sensors in a fault detection system used to determine the likelihood that a fault has occurred in the turbine engine. Thus, applicants again submit that the independent claims are patentably distinct over the cited references.

Conclusion

Based on the above, independent Claims 1 and 31 are patentable over the citations of record. The dependent claims are also submitted to be patentable for the reasons given above with respect to the independent claims and because each recite features which are patentable in its own right. Individual consideration of the dependent claims is respectfully solicited.

The other art of record is also not understood to disclose or suggest the inventive concept of the present invention as defined by the claims.

Hence, Applicant submits that the present application is in condition for allowance. Favorable reconsideration and withdrawal of the objections and rejections set forth in the above-noted Office Action, and an early Notice of Allowance are requested.

If the Examiner has any comments or suggestions that could place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the below-listed number.

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If for some reason Applicant has not paid a sufficient fee for this response, please consider this as authorization to charge Ingrassia, Fisher & Lorenz, Deposit Account No. 50-2091 for any fee which may be due.

Respectfully submitted,

INGRASSIA FISHER & LORENZ

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